The Lies of Unleaded Petrol

With alarming evidence emerging on toxic emissions from petroleum and catalytic converters, surely it's time we seriously considered some new energy alternatives.

Part 3

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In regard to additives in our petrol, the main question that needs to be asked is: "Why was all the fuss made about one toxic substance—lead—in our petrol, when the substances that have replaced it—benzene, other aromatics and olefines—appear to be more toxic?' It seems to me that if the genuine reason for taking lead out of petrol was for health reasons, efforts would have been made to ensure that what was used as a substitute was safer. There was little, if any, coverage at the time about what would be used instead of lead. In fact, petroleum companies, in Australia at least, don't even have to disclose the formulae they use to make up the petrol. Note that catalytic converters would quickly become useless if lead were in the petrol.

Benzene is a well-known carcinogen. Many medical studies have proved this to be the case. For example, Prof. Bill McCarthy, Executive Director of the Sydney Melanoma Unit, Royal Prince Alfred Hospital, is extremely concerned about the benzene levels in Sydney's centre and under aeroplane flight paths.[1] Dr Michael Dawson and Noel Child have taken benzene levels in Sydney and shown they are extremely high. Average levels were at 4.1 parts per billion (ppb) in summer and 7.6 ppb in winter, peaking at 12 ppb and 25 ppb respectively. Toluene levels were much higher.[2] Other cities around the world also show high levels. Britain has adopted a maximum of 5 ppb, with a national target to decrease levels below 1 ppb.

Benzene levels in fuels are around 2-3% (see tables in Part 2), but total aromatics are between 20-40%. It is important to realise that when these aromatics are combusted, a large percentage comes out in the exhaust as benzene—so the levels of benzene would be much higher than first expected. Many other aromatic substances also exist in exhaust gases, but all their effects, as well as human tolerance levels, have not been fully researched. Prof. Maltoni of Italy has directed studies researching the biological effects of benzene and many other substances from vehicle emissions. No studies have been done in Australia even to try to determine the total composition of exhausts.

One study, directed by Peter Anyon of the Federal Office of Road Safety[3], is analysing exhausts from 600 cars in order to find quick, cheap exhaust-monitoring methods and to determine whether subsequent appropriate mechanical work will reduce emissions. Initially the study was testing only for substances that are well known as problematic, i.e., listed in the Australian Design Rules as dangerous. These are total hydrocarbons, oxides of nitrogen, and carbon monoxide. But last year, when it became more well-known that benzene was a problem, an extension was added to the study to measure seven speciated hydrocarbon levels in 50 of the vehicles being tested. These include benzene, xylenes (three species), toluene, and 1,3-butadiene. It's a start.

Dr Hans Nieper reports on a new exhaust substance apparently produced in the catalytic converter, the consequences of which are quite shocking (see pages 21-22). What other reactions are occurring in catalytic converters that we don't know about? Are there any other dangerous exhaust gases whose effects we are yet to discover or fully realise?

An important product of the combustion of olefines is 1,3-butadiene, another substance that scientists have only recently discovered to be highly toxic. Much more research is needed here.

One other key aspect of all this is that the lead levels in leaded petrol have also been reduced. In fact, the benzene and total aromatics levels in leaded and standard unleaded petrol are virtually the same in many countries. The additional lead content is the only major difference between standard ULP and leaded petrol. The levels of benzene and other aromatics in premium unleaded fuel are extremely high—so I would urge people never to use this fuel.

Lead itself is undeniably a toxic substance. Much research has been done around the world to show its toxicity and effects. However, studies have failed to show the correlation between lead in petrol and lead in blood.[4] It seems that the lead from petrol exhausts has low bioavailability. Proper studies in these areas urgently need to be carried out.

There are many other sources of lead in our environment, such as lead water pipes, lead solder used in canned foods, lead paint, etc. From his research, environmental health consultant Dr Alan Bell says we should be looking at trying to get rid of flaking lead paint in old houses. He says studies have shown this to be a major source of lead in blood.[5] It does seem strange to me to replace a brain toxin that falls to the ground straight after coming out of the exhaust, with a gas that is released into our atmosphere and is well known as a highly toxic carcinogen.

I've received three letters telling me that the National Society for Clean Air in the UK has not withdrawn support for ULP. An extract from the society's letter to members states: "NSCA members may have seen an article in *The Sunday Times* of 12/12/93, claiming that the society has 'withdrawn its approval' for unleaded petrol because of concern about benzene emissions. This is untrue; the article quoted selectively from a long briefing given to the journalist in question and seriously misrepresented the society's position."[6]

Next is a letter I thought was worth reprinting, as it offers another perspective on some parts of our previous articles and suggests some interesting alternatives.

I read with interest the above article compiled by Catherine Simons. [See ULP Pt 1, vol. 2#25.]

It is not correct to say that early cars ran on exceptionally clean fuel; the quality was variable to say the least... The emissions of early cars were anything but clean, as the combustion process was a very hit-and-miss affair...

An engine cannot and never could produce only carbon dioxide and water vapour as the exhaust gas components; this works only in theory when complete combustion (or oxidation) takes place. There are a number of reasons for this which include: (1) the speed of the engine limiting the time available to burn the fuel; (2) the type and design of the combustion chamber; (3) the valve timing of the engine; (4) fuel retention around the piston ring lands; (5) fuel separation in the inlet manifold.

Power increases in motor vehicle engines were brought about not so much by increased compression ratios, but by the bore-to-stroke ratio. A short-stroke engine would be faster than a long-stroke. In this country [England] we suffered the setback of the Treasury rating for engines which, by the nature of the formula used, made the short-stroke engine prohibitively expensive to use from an owner's point of view, and consequently the only alternative was the long-stroke—good for torque output, but poor for high-speed running. Bugatti used to tease Bentley about his "racing lorries"...

Nitrogen, of which there is about 79% in the atmosphere, was never a problem, as, being inert, it was unaffected by combustion. Only when combustion temperatures reach figures of 2,500°C and above is the nitrogen oxidised, and it then produces four oxides which, in combination with hydrocarbons in the presence of sunlight, produces a smog. The worst of these oxides is nitrogen dioxide, which is a reddish-brown gas, an irritant, a supposed carcinogen, and which causes respiratory inflammation.

The catalytic converter was the worst possible answer to the problem of emissions. The solution was obvious—at least to British engineers: the way forward was by lean-burn technology. Not for the first time we led the rest of the world in this field, but a political decision opted for the use of converters.

From a logical point of view, using two very precious metals as catalysts is a crazy idea: platinum is obvious; less obvious is rhodium, until you realise that 99% of all rhodium mined comes from South Africa. If, at any future time, problems arose whereby it would not be possible to trade with South Africa, then the consequences would be obvious.

Having watched America at work with catalytic converters for a number of years, it was obvious even to the meanest intelligence—including bureaucrats—that the system was not an effective remedy; so, naturally, the thing to do was then adopt the American (Californian) system in total and apply it to Europe, taking care to ignore the fact that the conditions in the two locations were completely different, and therefore the figures were meaningless.

Catalytic converters take time to warm up, and until they do so they are every bit as 'dirty' as a vehicle without one. In fact, the 'bad egg' smell which emanates from the exhaust is hydrogen sulphide, a gas which is thought by some experts to be highly carcinogenic.

Unfortunately big money/business is involved, and this almost always clouds the facts and the truth. For some inexplicable reason, vested interests always seem to be mutually exclusive to the truth.

With lead in fuel, although it was by no means ideal, at least we knew where it was going. Now, with the emission gases being lighter, they may well be collecting but at a higher point off the ground, and it may be years before we see what the results of this will be.

The picture is not entirely gloomy, however; there are very positive aspects to all of this, and to the way forward in the short, medium and long term.

The informed thinking for the future is:

1. Lean-burn technology.

2. A lean-burn catalyst. This is very different to the present idea, in that it seeks to remove oxygen from an oxygen-rich environment, so that the nitrogen will once again emerge from the exhaust pipe as nitrogen—but without the oxides.

3. The use of specialised upper-cylinder lubricants. These are already available, and everyday motorists can add these to a tank of fuel, safe in the knowledge that they can do something to improve the air quality and reduce the pollutants emitted from their exhausts.

Other options are also available to use a fuel with a reduced carbon content. One possibility in this field is methane, which has only one carbon atom (compared to octane, for example, which has eight). This will have the immediate effect of reducing carbon dioxide.

The idea of the battery car, when examined for a moment, is really a non-starter (no pun intended!). Although, when it is running, it is indeed almost pollution-free, the power consumed to make the batteries is considerable. The power-to-weight factor is as yet unacceptable, the fuel consumed at the power station to recharge the batteries is high, and, lastly, lead-acid batteries are difficult to dispose of when their useful life is over.

One idea which I am actively working on is steam. It has every possible advantage (and none of the disadvantages mentioned above): maximum power and torque at standstill, recycled exhaust, therefore zero emissions (if there were any emissions they would be only water vapour). The engine would only need to be a three-cylinder two-stroke, equivalent to a six-cylinder four-stroke: very few moving parts ensures reliability and performance. The heat source: a hydrogen catalyst, providing motive power within 10 seconds of starting.

The problem with this design? Apathy/animosity from the 'vested interests'. There is no doubt that this design will not meet with their approval as it is contrary to their thinking at this time. It requires people with vision and commitment to back this idea in order that it may work...

Yours faithfully,

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Footnotes:

1. Professor Bill McCarthy, Melanoma Unit, Royal Prince Alfred Hospital, "Submission to the Senate Select Committee on Aircraft Noise in Sydney", 8 May 1995.
2. Dr Alan Bell, *Public Health Bulletin*, March 1995; S. Corbett and C. Cowie, *Public Health Bulletin*, November 1993.
3. Telephone conversation between C. Simons and Peter Anyon, Director, Regulation Policy and Projects, Federal Office of Road Safety, Canberra, ACT, Australia, July 1995.
4. Simon Grose, *The Canberra Times*, 26 March 1994.
5. Telephone conversation between C. Simons and Dr Alan Bell, Environmental Health Consultant, Mosman, Sydney, Australia, July 1995.
6. National Society for Clean Air (UK), Briefing to Members, 1994.

General reference: Telephone conversation between C. Simons and Brian Wells, Australian Automobile Association, July 1995.